National Systematics Laboratory Report for Calendar Year 1995

Washington, D.C.

July 1996

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U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service

ANNUAL REPORT
National Systematics Laboratory
Calendar Year 1995

Washington, D.C.
July 1996

U.S. DEPARTMENT OF COMMERCE
Mickey Kantor, Secretary

National Oceanic and Atmospheric Administration
D. James Baker, Under Secretary for
Oceans and Atmosphere

National Marine Fisheries Service
Rolland A. Schmitten, Assistant Administrator for Fisheries

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1995 HIGHLIGHTS

- Systematic study assigns cape lobster to *Homarinus*, new genus
- Fish collections of United States and Canada surveyed
- Previous classifications of tunas and billfishes re-evaluated
- Species identification accounts for seven families of fishes in the eastern Central Pacific published by FAO
- New genus and species of caridean shrimp described from hydrothermal vents on Loihi Seamount, Hawaii
- New genus and species of halfbeak described from Sulawesi
- Species identification accounts completed for FAO for fourteen families of fishes in the West Central Pacific
- Systematics Laboratory taxonomists contribute expertise to FAO Sponsored Workshop in Manila on Commercially Important Fishery Organisms in the Indo-Pacific Region
- Catalog of the seven families, 56 genera, and 500 species of penaeoid shrimps completed
- Revision of frigate tunas (*Auxis*) completed

MISSION

The National Systematics Laboratory is the primary element of NOAA involved in defining and characterizing marine biodiversity. We conduct taxonomic research on marine organisms of economic and ecological value to the United States. In addition to providing taxonomic information on species that are commercially important, scientific studies conducted by Systematics Laboratory personnel comprise significant contributions to the study of marine biodiversity by describing and naming new species as well as revising existing names and descriptions based on new information. Because many important marine species are widespread or migratory, our research is world-wide.

Accurate taxonomic information is the critical first step in recognizing individual species. This information leads to an understanding of the diversity of marine communities and is the necessary basis for proper management of our nation's living marine resources. Without a clear understanding of what individual species look like, where they are found, and what their correct names are, we cannot collect accurate statistics, develop reasonable national fishing and conservation regulations, set catch limits, or begin to understand the complexity and diversity of marine communities.

The Systematics Laboratory is actively involved in studying the taxonomy and biodiversity of fishes, crustaceans, and squids. We have a permanent staff of four systematists, an emeritus systematist, two museum technicians, and a scientific illustrator. The systematists include Drs. Bruce B. Collette and Thomas Munroe as ichthyologists, Dr. Michael Vecchione as a malacologist specializing in squids, and Drs. Austin Williams and Isabel Canet (Pérez Farfante) as decapod crustacean specialists. In addition, we currently have a Research Associate funded by ESDIM, Dr. Mary Mickevich and a visiting investigator, from the NOAA National Undersea Research Program, Dr. David Stein. Last summer we had four summer student interns.

A unit of the Northeast Fisheries Science Center, National Marine Fisheries Service, we are located in the National Museum of Natural History, where we can take advantage of one of the world's leading systems of collections, libraries, equipment, and facilities that are designed specifically for taxonomic and systematic research. The opportunity to meet and collaborate with other taxonomic experts who reside in or visit the Smithsonian keeps us current on the latest ideas and techniques in the field. As Smithsonian Research Associates, we expand Smithsonian scientific capabilities and help build and curate Smithsonian collections.

The Systematics Laboratory has two major responsibilities, research and service. Our research produces two principal products: 1) worldwide and regional taxonomic monographs, which are scholarly documents that identify, describe, and catalogue the diversity of species within selected taxa of marine organisms of commercial or ecological importance; and 2) various aids to identification. These documents provide the necessary information for non-specialists to recognize and identify marine organisms.

The Systematics Laboratory serves many public as well as private institutions and individuals worldwide by providing expert identifications and information for a diversity of marine organisms including, but not limited to, the groups we study. We also review and comment upon manuscripts for scientific journals and for colleagues in the National Marine Fisheries Service, other agencies, and academia. Our staff evaluates research proposals for the National Science Foundation, Sea Grant, and similar research funding agencies.

In addition to these activities, staff members serve as officers of various scientific associations and participate in university affairs as research associates and adjunct professors.

HISTORY

The origin of the National Systematics Laboratory can be traced back to 15 August 1942, when Samuel F. Hildebrand moved into the Division of Fishes of the National Museum of Natural History to continue his ichthyological research for the Department of the Interior's Bureau of Fisheries; this followed the merger of the Bureau of Fisheries fish collection with that of the U. S. National Museum. The Laboratory, then the National Center for Systematics, was transferred from the Department of the Interior to the National Oceanic and Atmospheric Administration in 1970 and renamed the National Systematics Laboratory. The Laboratory is administered by the Northeast Fisheries Science Center, National Marine Fisheries Service, but also is responsible to the National Marine Fisheries Service Research Council and other regional Fisheries Science Centers.

RESEARCH

Fifteen papers by NSL scientists were published in calendar year 1995 (listed at end of this report). Research completed in 1995 and earlier has led to 24 more papers that are now in press. Seven additional manuscripts were completed. Major accomplishments in 1995 are listed below for each of the three investigations: fishes, crustaceans and squids.

FISHES

1. Tunas and mackerels.--Pelagic fishes of great importance to man live in the highly productive surface layers of the ocean where species tend to grow large and range widely. Emphasis is devoted to studying the anatomy and systematics of scombroids, the group that includes the tunas, Spanish mackerels, bonitos, and mackerels. The giant tunas, bonitos, Spanish mackerels, and double-lined mackerels found around the world have been treated by Dr. Collette and colleagues in a series of monographs and papers. Together with two colleagues, Kent Carpenter (FAO) and Joe Russo (Smithsonian), Bruce Collette used a new technique, called quantitative evolutionary systematics, to classify the tunas, mackerels and their relatives in a controversial paper published in the *Bulletin of Marine Science*. This technique produced a classification consistent with the classification currently in use, it summarizes anagenetic as well as phylogenetic information, and it can be considered a new form of cladistic classification. The long-delayed revision of the frigate tunas of the genus *Auxis*, including descriptions of two new subspecies from the eastern Pacific, was submitted to the *Fishery Bulletin* in 1995. Judging from the large numbers of larvae taken in larval surveys, frigate tunas are among the most abundant of the tunas. So far, they have been little exploited except in some third world countries. It is important to have their systematics on a sound basis before greater exploitation occurs but the two species have been difficult to distinguish. This paper concludes the series of five detailed revisions of groups of tunas and their relatives begun 35 years ago.

2. Halfbeaks and needlefishes.--Several other groups of fishes are also under study. These include halfbeaks (Hemiramphidae) and needlefishes (Belonidae), abundant fishes, which are important forage species and are of local importance as food and bait. Monographs on these two families are being prepared by Dr. Collette for the monographic series, *Fishes of the western North Atlantic*. Dr. Collette and N.V. Parin (Russian Academy of Sciences) are preparing a world catalogue of the species of Beloniformes (halfbeaks, needlefishes, sauries, and flyingfishes) at the request of FAO. A paper describing a new genus of halfbeaks from Sulawesi (formerly the Celebes) was published (Fig. 1). Kristina Louie, Smithsonian summer intern with Bruce Collette two years ago, received a grant from the Richter Foundation at Occidental College to travel to Sulawesi to collect halfbeaks of the genus *Nomorhamphus* to complete a revision of the genus with Dr. Collette. Heidi Banford (VIMS graduate

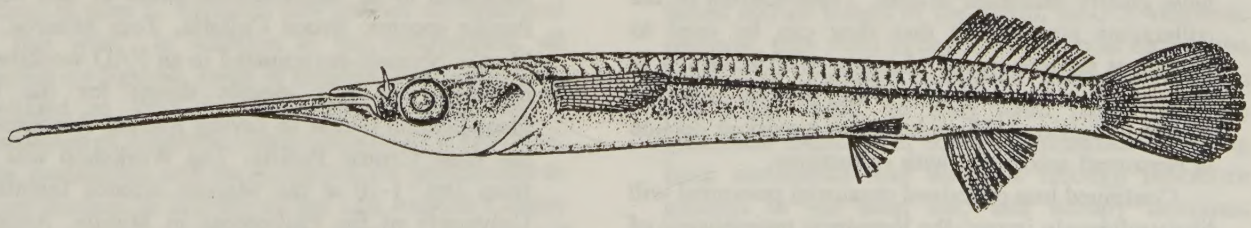

Figure 1. *Tondanichthys kottelati*, holotype, ZRC 38999, 60.1 mm SL.

student on whose committee Dr. Collette serves) received a grant from the National Geographic Society to collect tissue from halfbeaks, needlefishes, toadfishes, and Spanish mackerels in West Africa to test, with molecular methods, their hypothesis that the single eastern Atlantic species of each of these four genera is the primitive sister-species of all the American species of their clades.

3. Fishes of the Gulf of Maine.--A revision of Henry B. Bigelow and William C. Schroeder's classic 1953 volume *Fishes of the Gulf of Maine* is underway by Drs. Collette and MacPhee. During this period, draft accounts for several sections were drafted: Agnatha (lamprey and hagfish) by Don Flescher and Rick Martini, Stomiidae and Myctophidae by Jim Craddock and Karsten Hartel, Aulopiformes by Ken Tighe, and Sphyraenidae by Rodney Rountree. Two sections were reviewed: chimaeras by Dominique Didier, toadfishes by Mike Fine. Accounts for 231 of the approximately 251 species (96%) have now been written. Remaining are the Salmonidae, Mugilidae, Zeiformes, and stichaeoids, a total of about 14 species. Progress was slowed by termination of Grace MacPhee's contract, death of one contributor, failure of a couple contributors to finish their sections, and lack of support personnel at NSL. Current efforts are directed toward completion of the remaining species accounts and editing the text into a more uniform style. Hopefully, the revision can be completed by the end of 1996 and submitted to the Smithsonian Press.

4. Second Survey of Fish Collections.--A second survey of fish collections in the United States and Canada conducted by B. Collette and S. Poss for the American Society of Ichthyologists and Herpetologists reveals holdings of about 63.7 million specimens in the 118 collections responding to the survey. Subsequent to the first survey, there have been significant differences in growth rates among collections and a notable increase in the computerization of collections-related information. The quality of curation has measurably improved. Special collections, most notably larval collections, have greatly increased in size. Three-fourths of the collections now report that they can be used to document environmental changes, with holdings of extinct and endangered species and hybrids increased among collections. There has been a marked decline in personnel associated with collections.

Continued loss of trained curatorial personnel will likely adversely impact the long-term maintenance of existing archival collections. A reduction in the number of scientists engaged in collections-based research and education will probably impede efforts to study and preserve biodiversity. Results of both surveys emphasize the importance of maintaining accurate information about collections. Further joint data sharing among collections personnel may be effective in meeting challenges faced by managers and users of collections.

5. Flatfishes.--Tom Munroe is conducting systematic research on several families of flatfishes (Pleuronectiformes), including several projects in collaboration with other investigators. A manuscript (with Dr. Juan Diaz de Astarloa, Universidad Nacional de Mar del Plata, Argentina) describing systematics and osteology of paralichthyid flounders occurring in Argentine waters was revised. A draft revision of western Atlantic species of tonguefishes (*Symphurus*) was completed. This paper provides keys for identification, updated synonymies, re-descriptions, and summaries of ecological information for all 24 species occurring in the western Atlantic ocean. Dr. Munroe is co-advisor for a master's thesis project undertaken by Mr. M. Terwilliger, Virginia Institute of Marine Science. Mr. Terwilliger is examining age-growth and reproductive biology of blackcheek tonguefish in Chesapeake Bay. This is the first attempt to detail life-history aspects for a Western Atlantic symphurine tonguefish. A manuscript (with Barnaby Marsh, Smithsonian summer intern in 1994), on three little-known species of Indo-Pacific species of *Symphurus* was completed and submitted. Accounts for seven families were published in an identification guide to east central Pacific species. Results of a phylogenetic study based on osteological characters of the round soles (Achiridae) in collaboration with Dr. Francois Chapleau, University of Ottawa, were presented at the annual meeting of the American Society of Ichthyologists and Herpetologists in June.

6. FAO.--The Systematics Laboratory continues to support the efforts of international organizations to make the results of systematic research available to a wider audience. Accounts for seven families were published in an identification guide to east central Pacific species. Bruce Collette, Tom Munroe, and Martha Nizinski participated in an FAO workshop to field-test and edit species sheets for the FAO Identification Guide to Living Marine Resources of the West Central Pacific. The Workshop was held from Oct. 1-10 at the Marine Science Institute of University of the Philippines in Manila. About 85 primary authors from many different countries con-

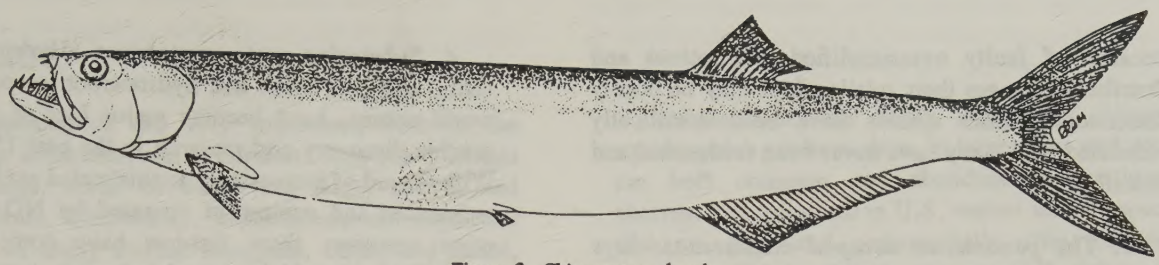

Figure 2. *Chirocentrus dorab*.

tributed sections to this Identification Guide. Bruce Collette wrote sheets for the Ammodytidae, Belonidae, Coryphaenidae, Echeneidae, Hemiramphidae, Pomatomidae, Rachycentridae, and Scombridae. Tom Munroe wrote accounts for Soleidae and Cynoglossidae, and in collaboration with Martha Nizinski, wrote accounts for the herring-like fishes (families Chirocentridae, Fig. 2, Clupeidae, Engraulididae, and Pristigasteridae). At the workshop, identification keys were tested using fresh specimens trawled or bought in fish markets. Drs. Collette and N.V. Parin (Russian Academy of Sciences) are preparing a world catalogue of beloniform fishes (flyingfishes, sauries, needlefishes, and halfbeaks) for FAO and Dr. Munroe is preparing a world catalogue of the soles of the family Cynoglossidae.

7. Tautog biology.--A study of the reproductive biology of tautog in Virginian waters is being conducted by master's degree student Mr. G. White, Virginia Institute of Marine Science. Dr. Munroe is co-advisor of his thesis committee. Data derived from this study will assist fishery managers when considering options to maintain or improve stocks of this species.

8. Antarctic Liparidae.--Dr. David Stein, working with Dr. Anatoly Andriashev, Academician of the Russian Academy of Sciences, St. Petersburg, Russia, is completing a monograph on Antarctic *Careproctus* (Liparidae). The review includes descriptions, redescriptions, and additional information on 27 species occurring in the Southern Ocean or near it. Eighteen new species are described in this work. In addition to the descriptions, all species are figured, many in multiple illustrations, are included in keys for their identification, and a discussion of Antarctic ichthyogeography is provided. The manuscript will be submitted for publication to *Contributions in Science* of the Los Angeles County Museum. This monograph marks the completion of recent review of all liparid species occurring in the Southern Ocean. With addition of these new species, the family Liparidae is clearly one of the most speciose fish families to occur in the region, and is by a substantial margin the most speciose non-endemic family occurring in this area.

CRUSTACEANS

The groups of crustaceans most directly important to fisheries are the shrimps (mainly penaeoid species), lobsters, and crabs. Research on shrimps in the National Systematics Laboratory is conducted by Carcinologist Emeritus Dr. Isabel C. Canet (Pérez Farfante), and that on crabs, lobsters, and other decapods by Dr. Austin B. Williams.

The shrimp fishery is the most valuable single segment of the U.S. industry. In 1995 (latest available statistics) domestic commercial landings amounted to 306,869 thousand pounds (heads-on-weight) with an ex-vessel value of $0.570 billion dollars. In 1995, 597,204 thousand pounds (heads off), with a value of $2.6 billion were imported. To satisfy this great demand, more species have been added to the list of commercially valuable shrimps during the last few years, new beds have been exploited in shallow and deep waters of nearby and distant regions, and aquacultural imports continue to increase. Management efforts and meaningful ecological and physiological studies require knowledge of the systematics of these crustaceans.

Crabs and lobsters are among the most conspicuous crustaceans in catches from heavily fished marine waters of the world. In U.S. domestic landings, they yield in combination about half of the tonnage of domestic crustacean fishery production and dollar value. In their adult phase they are prominent members of bottom communities, ranging from marshlands and estuaries through nearshore systems to the deep sea, and occupy dominant positions in the biological communities where they live. Some species are seemingly well known, but

because of faulty oversimplified descriptions and distribution ranges their relationships may be poorly understood. Other species have been uncritically identified, and many have never been recognized and described.

1. The penaeidean decapod crustaceans: keys and diagnoses to the families and genera.--Dr. Isabel Pérez Farfante and Dr. Brian Kensley of the Department of Invertebrate Zoology in the Smithsonian Institution National Museum of Natural History are collaborating on a systematic revision and catalogue of penaeidean shrimps. Character-matrices have been developed, and cladistic analyses using PAUP and HENNIG86 have been run. Illustrations for 56 genera are given. For each of about 56 genera covered in the catalogue, the following information is included: original reference, synonyms, type-species, gender, full diagnosis, list of nominal species, and distribution. The paper, in press, will be published as a book by the Smithsonian Institution.

2. Biology of the American lobster.--Dr. Williams wrote a chapter on taxonomy and evolution of the American lobster in "Biology of the lobster, *Homarus americanus*," a multi-authored book that was published by Academic Press, Inc. in 1995. This work is the successor to the classic works (1896, 1911) on this species by F. H. Herrick.

3. Cape lobster of South Africa assigned to new genus.--Three species of nephropid lobsters have been recognized in the genus *Homarus*: the American and European lobsters, *H. americanus* and *H. gammarus* of the northwestern and northeastern Atlantic, respectively, and the Cape lobster of South Africa, *H. capensis*, few specimens of which have been studied until recently. Dr. Williams and Drs. Kornfield and Steneck, University of Maine, after study of the old and new material, transferred the South African species to a monotypic new genus *Homarinus*. Far smaller than its northern relatives, with a maximum observed carapace length of 47 mm, the Cape lobster has first chelae adorned with a thick mat of plumose setae, whereas these setae are absent in *Homarus*. Other structural differences and comparative analysis of DNA from the mitochondrial 16s rRNA gene demonstrate considerable divergence from its putative congeners and support taxonomic distinction.

4. Submarine-vent crustaceans.--Hydrothermal vents, and cold brine and hydrocarbon seeps in the world oceans, have become major foci of oceanographic discovery and research in the past 15 years. With the aid of increasingly sophisticated exploratory techniques and equipment operated by NOAA and other agencies, these features have come to be recognized as widely associated with tectonically active zones of the ocean floor. The vents and seeps have been in existence since very early in the earth's history, and through geological and biological processes have had profound influence on the oceans. Through time, representatives of many organismic groups have adapted to unique systems of nutrition in these environments at depths beyond the reach of light, and among the groups represented are decapod crustaceans. From the first discovery of these features, Dr. Williams has been describing decapods collected from them. In a paper with Dr. F. C. Dobbs, Department of Oceanography, Old Dominion University, Norfolk, VA, Dr. Williams described a new shrimp from hydrothermal vents in Hawaii (Fig. 3). He also identified collections of other crustaceans from hydrothermal vents on the mid-Atlantic Ridge and western Indo-Pacific Ocean.

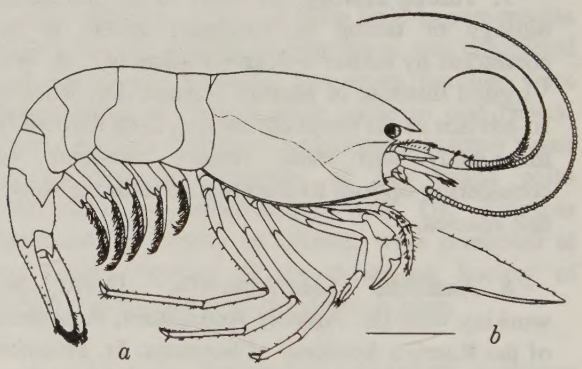

Figure 3. *Opaepele loihi*, female holotype: a, lateral view; b, rostrum enlarged.

5. Nomenclatural problems.--Dr. Williams provided comment on four cases before the International Commission on Zoological Nomenclature that concerned crustaceans.

SQUIDS

Cephalopods are very important, both to the marine ecosystem and to humans. They are abundant predators, some of which are large, active, and voracious. Conversely, cephalopods are important prey for many marine mammals, birds, and fishes, including economically important species. Substantial squid fisheries have existed in North America almost exclusively to provide bait for other fisheries. Cephalopods are also important as food for people in many parts of the world. Furthermore, they are important in biomedical research; much of what is known about neurophysiology results from experiments with the giant axon of the squid *Loligo*.

Squid fisheries, both in U.S. waters and worldwide, concentrate on species from two families, Loliginidae and Ommastrephidae. In the United States, these fisheries currently are primarily an export industry, although utilization in the United States is increasing.

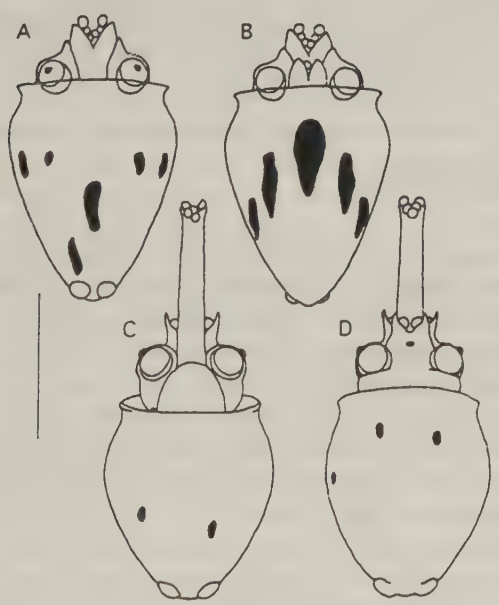

Figure 4. A, B. *Ommastrephes bartramii*. Ventral and dorsal views of a 2-day-old hatchling from an artificially fertilized egg showing chromatophore pattern. Note the pair of enlarged proboscis suckers and short proboscis. C, D. *Sthenoteuthis oualaniensis*. Ventral and dorsal views of a 4-day-old hatchling from an artificially fertilized egg showing chromatophore pattern. Note equal sized proboscis suckers and length of the proboscis.

Loliginids include many species of demersal squids which attain medium to large sizes and which are both common and abundant on continental shelves. The loliginids in U.S. waters include species that are harvested commercially (the long-term potential yield from the east coast U.S. fishery has been estimated at 44,000 tons), but which are quite difficult to identify. Additionally, there are several other species of small loliginids found in U.S. waters. Generic relationships of the species are presently very confused. Five conflicting classification schemes have been proposed, based on single characters, on regional material, or on arguments that have been institutionalized in outdated literature. Because the diverse family Loliginidae is cosmopolitan, the only way to resolve relationships within it adequately is by worldwide systematic review of the taxonomic characters. Dr. Michael Vecchione, together with several colleagues, is reviewing the loliginids.

Commercially and ecologically, the most important ommastrephids in U.S. waters belong to the genus *Illex*. The potential catch of *Illex* in U.S. waters is 30,000 tons. There are four groups of *Illex* in the western Atlantic which are more or less distinct morphologically. It has been proposed that these morphotypes are separate species, although some authors still consider them to be subspecies. These arguments, based primarily upon preserved specimens, have not fully considered other components of morphological variability (e.g., geographic, seasonal, sexual, ontogenetic). Dr. Vecchione is conducting a study of *Illex* treating several components of variability from fresh as well as preserved material.

1. Volume on Cephalopod Systematics and Biogeography.--Together with Prof. Nancy Voss, University of Miami, and Dr. Ronald Toll, University of the South, Dr. Vecchione is editing a volume on Cephalopod Systematics and Biogeography. The multi-authored volume resulted from a two-week international workshop conducted at George Washington University and sponsored by the Smithsonian Institution.

2. Multi-media data base on deepsea cephalopods.--A multi-media package still under development uses a micro-computer to show data and images of deepsea cephalopods observed in-situ from submersibles. All collection data, e.g., geographic location, depth, etc., form the data base (from which searches can be made) and are linked with images of species from videotape or 35 mm slides. The taxon-based system can serve as a catalogue or key in the laboratory or for observers on-board submersibles or using ROV's. The system was created on an IBM-type micro-computer using dBase files and Asymetrix Toolbook software running under Microsoft Windows.

3. Student research.--Dr. Vecchione is supervising several graduate research projects on cephalopods. Elizabeth Shea's thesis at the College of William and Mary, with the aid of a museum collection of planktonic squids, examined the heuristic value of the newly established concept of "paralarvae", which includes combined morphological and ecological criteria for determination of life-history stages. David Carlini of William and Mary has begun a DNA study supervised by Dr. Vecchione on the higher-level systematics of cephalopods. Guillermo Sanchez from the University of Southern Mississippi collaborated with Dr. Vecchione using biochemistry for identification of juvenile *Loligo* and found four species and possible hybridization in the Gulf of Mexico.

4. Relationships among families of cephalopods.--Fundamental questions about the relationships among groups of cephalopods above the family level hamper interpretation of comparative biology. For example, it has been proposed that *Loligo* is more closely related to the cuttlefishes than to the true squids. Numerous other problems about confusing relationships are equally troubling. Working with several other scientists, Mike Vecchione has begun a review of the higher-level systematics of the Cephalopoda. Collaborators include Richard Young of the University of Hawaii (morphology), John Graves and Ph.D. student David Carlini at the Virginia Institute of Marine Science (DNA sequencing), Desmond Donovan from University College London (fossils), and Mary Mickevich, NSL research associate (cladistic analysis).

5. New England deep-water squids.--Difficult economic conditions for New England's commercial fishing fleet have lead to a search for new resources. Federal grants from the Saltenstall-Kennedy program have been used to subsidize exploratory trawling beyond the edge of the continental shelf by the F/V CONTENDER. Potential targets include deepwater species of fishes, decapod crustaceans, and cephalopods. NSL is assisting with identifications and biological information about this deepwater material. The first six cruises of the CONTENDER captured 15 species of cephalopods in 11 families.

6. Electronic information.--Working with Michael Sweeney, Clyde Roper, and James Felley of the Smithsonian Institution, Dr. Vecchione helped to incorporate a computerized cephalopod bibliography into the Smithsonian Institution Research Information System (SIRIS). SIRIS can be accessed by telnet via the Internet or by modem. The cephalopod bibliographic catalog describes publications (books, journal articles, etc.) about Recent cephalopods and related subjects, such as predators, prey, etc. This bibliography comprises about 4500 publications located at the Division of Mollusks, National Museum of Natural History. At present, the entries concentrate primarily on works in English or those with an English summary. Dr. Vecchione has also compiled a list of e-mail addresses for over 200 cephalopod researchers around the world. This list is available through the Eurosquid discussion group and the Cephalopod International Advisory Council home page on the World Wide Web.

FIELD WORK

1. Fossil Crustaceans.--Dr. Williams collected fossil decapod crustaceans from late Cretaceous deposits in South Dakota, Wyoming and Montana during July-August. This and previous similar work done in collaboration with Dr. G. A. Bishop, paleontologist at Georgia Southern University, Statesboro, GA, has led to papers of evolutionary significance on primitive lobsters and crabs in these deposits. Other manuscripts on the subject are in progress.

2. Burrowing Shrimp.--Dr. Austin Williams in conjunction with H. Allen Curran, Department of Geology, Smith College, Northampton, MA., identified thalassinidean shrimps and studied their burrow formation in San Salvador, Bahamas.

BIODIVERSITY

During the year, NSL staff devoted considerable time and effort on marine biodiversity, planning and participating in a wide array of meetings and workshops. We believe that classic fishery biology and the newer efforts dealing with protected species and habitat protection should be incorporated into a broad ecosystem approach and that maintaining high levels of indigenous biodiversity is an important part of that approach.

1. National Biodiversity Information Center (NBIC).--Bruce Collette, Tom Munroe, and Mike Vecchione were invited observers to a March meeting at the Smithsonian Advisory Planning Board dealing with the formation of a National Biodiversity Information Center. The proposed center would function as a directory or "card catalogue" for the vast and growing body of biodiversity information collected by governmental and non-governmental agencies. Bruce Collette and Tom Munroe were then selected to represent marine interests as members of the NBIC Drafting Committee to produce a consensus document. The NBIC Advisory Committee met again in November to approve the consensus document.

2. Interagency Taxonomic Information System (ITIS).--The Interagency Taxonomic Steering Committee was formed to devise methods for replacing the taxonomic list of organisms of the National Oceanographic Data Center (NODC) with a new system that will meet the demands of the National Information Infrastructure. The Steering Committee has representatives from EPA, USGS, National Biological Service, NOAA, Agriculture, and the Smithsonian. The Steering Committee formed two workgroups: the Taxonomic Work Group (TWG) with Bruce Collette as NMFS representative, and the Data Base Work Group with Mary Mickevich representing NMFS. Dr. Mickevich is supported with ESDIM funds to develop a U.S. National Marine Biodiversity Database (MARBID) and is working in association with the NSL. The main goal of ITIS is to produce a taxonomically credible list of organisms, starting with the United States. Bruce Collette, Mary Mickevich, and Roy McDiarmid, an NBS colleague, presented a poster on ITIS at the annual meeting of the American Society of Ichthyologists and Herpetologists in June. An ITIS Home Page has been set up and it is hoped that the first groups, decapod crustaceans and terrestrial and freshwater vertebrates, will be on the Net soon.

3. Systematics Resources Working Group.--An 8-member committee was formed to implement the Memorandum of Understanding between the Association of Systematics Collections (ASC) and the National Biological Service (NBS). The Working Group consists of two NBS representatives, three ASC representatives (from three different museums), and one representative each from NOAA, EPA, and the Department of Agriculture. Bruce Collette serves as the representative from NOAA. The Group met at the University of California, Berkeley prior to the annual meeting of the Association of Systematics Collections in June 28-29. Priorities outlined by the Group include: a strategy for capturing essential data in museum collections for priority taxa; a summary description and applications of systematics for an Internet Home Page for the ASC; list of collections resources by taxon and geographic region (such as the list of U.S. and Canadian fish collections published by Poss and Collette); a list of U.S. systematists and their areas of taxonomic and geographic expertise; priority list of taxonomic groups in need of systematics expertise.

4. Intensive Marine Inventories.--A workshop on "Intensive Marine Inventories and their Contribution to the Reorganization of Systematics" was held at the Smithsonian October 26-28, sponsored by the Smithsonian and the Center for Marine Conservation. Bruce Collette represented NMFS/NOAA in this effort to formulate a marine program parallel to the All Taxon Biotic Survey (ATBI) being developed by Dan Janzen for all biota in Guanacoste, Costa Rica. About two dozen participants from the U.S., Canada, Mexico, Dominican Republic, Cuba, and Great Britain discussed a mission statement for a marine ATBI, logistic and administrative needs, the state of marine systematics, and likely products of an MATBI.

5. Taxon Protocol Committee.-- NSL formed this committee in Nov. 1993 with representation from Smithsonian Institution systematists as well as those from the NSL. We are concerned about the taxonomic credibility of scientific names that will form a US Marine Biodiversity Database (MARBID). The goal of the committee is to establish standards that will inform users of the database of the state of knowledge about a particular species or group of organisms. Just as the Weather Service places a level of probability on its forecasts, we hope to place a level of believability on the components of the NMBD. Three documents have been drafted:

1. Systematic Publications.--Standards for acceptable publications for systematic information; 2) New Species Recognition.- Standards for acceptable new species descriptions; and 3) Color Coded Ratings for Published Taxonomic Works.- Standards that color code the results of a taxonomic publication in either red, yellow, or green. These colors represent the degree of scientific reliability of the taxa according to the Taxon Protocol Committee's standards. Green means highly reliable, yellow requires caution and red conveys the idea that the group is very poorly known in a systematic context.

6. The US Marine Biodiversity Database (MARBID).--NMFS is centering its biodiversity efforts around ecosystems. To understand the extent of an ecosystem, and the effects of physical parameters on an ecosystem, it is necessary to follow the effects of these parameters on individual species over differing physical conditions. These questions require data which describe the distributions of species within the ecosystem through time and space. NMFS survey data comprises the best available information on species through time and space. The MARBID database (USMBD) is an information system which will follow many important marine species through time and space. With large numbers of different organisms found within marine ecosystems, the challenge is both to organize vast amounts of information and to maintain high scientific standards for this information. Although scientific standards of a study may be high, the information generated may have low reliability reflected in low limits. We intend to reflect these confidence limits for all our databases. Dr. Mickevich has designed the Upper Level Architecture of the MARBID along with the major taxonomic database which will describe both the acceptable taxonomy and its underlying reliability. Reliability will be reflected visually with color. Anyone looking at a component of the database will understand its reliability immediately because the color of the displayed name will reflect its reliability.

7. NOAA Standing Committee on Biodiversity and Ecosystem Management.--Drs. Collette and Vecchione are members of this committee, which provides advice to NOAA leadership on questions involving biodiversity.

8. Biodiversity Publications.-- In order to explain the relevance of systematics and marine biodiversity to fisheries, NSL staff have written a series of papers. A paper by Drs. Collette and Vecchione on the relationships of systematics and fisheries was published in *Fisheries*. This paper resulted from the Fisheries Committee of Systematics Agenda 2000, an effort by systematics organizations to explain the significance and national need for systematics. Another paper, outlining the role fisheries agencies can play in understanding and managing marine biodiversity, was presented by Mike Vecchione at a 1994 symposium at the Missouri Botanical Garden, and is now in press.

SCIENTIFIC ILLUSTRATION/ TRANSLATION

1. Illustrations of fishes, crabs, and cephalopods, drawn by Ms. Keiko Moore, Scientific Illustrator, appeared in several papers published by laboratory scientists in 1995. Additional figures were also drawn for several manuscripts accepted or submitted for publication, including drawings of a new species of freshwater halfbeak, *Tondanichthys kottelati*, from Sulawezi and a new toadfish, *Potamobatrachus trispinosus*, from South America for Dr. Collette, and for Dr. Williams, a new species of shrimp, *Opaepele loihi*, from hydrothermal vents off Hawaii, the Cape lobster, two new species of squat lobsters, *Mundiopsis*, from deepwaters of the western Atlantic, as well as several plates of illustrations featuring species of deepwater crabs, *Latreillia*, for a monographic revision in progress.

2. Ms. Moore continued to translate scientific papers, mostly from Japanese (less often, Chinese), for Systematics Laboratory scientists, and Smithsonian scientists and librarians. Additionally, Ms. Moore serves as an interpreter and guiding official for visitors to the Systematics Laboratory and the National Museum of Natural History from Japanese museums and universities.

3. Ms. Moore provided advice on scientific illustration techniques to two foreign visitors (one from Holland and the other from Russia) during 1995.

4. In August, the Department of Education, Montgomery County, Maryland, announced that a Japanese language textbook "Building Bridges Between America and Japan: Learning Customs and Culture of Japan" to be included in the Foreign Language Programs for elementary school children had been published. Ms. Moore designed the cover, featuring Japanese bamboo done in brush and ink, and also wrote an illustrated article on techniques for making Japanese woodblock prints for inclusion in the chapter on "Arts and Crafts."

SERVICE

In addition to their research responsibilities, scientists from the Systematics Laboratory serve the scientific community and the public in other ways. The primary service functions of this Laboratory are to provide expert identifications for groups of fishes, crustaceans, and squids in which we specialize, and to furnish information on these animals. We assist visitors in the use of the national collections. We review manuscripts for scientific publications, for colleagues in NMFS, and other agencies and academia. Finally, we assist staffs of the divisions of Fishes, Crustacea, and Mollusks of the National Museum of Natural History with curation and loans, especially material collected by NMFS.

INFORMATION

ORGANIZATIONS	CONTACTS
Agency for International Development	L. Trott
American Museum of Natural History	N. Platnick
American Society of Ichthyologists & Herpetologists	D. Greenfield
Auburn University, Mobile, AL	J. Howe
Baruch Institute, University of South Carolina	M. Reichert
Biological Society of Washington	B. Robbins
Bishop Museum	J. Miller, D. Polhemus
British Antartic Survey	P. Rodhouse
California Academy of Sciences	A. Leviton, W. Clemens
Center for Marine Conservation	M. Smith, E. Norse
Charles Darwin Foundation	S. Steruve
CICIMAR, La Paz, Baja California, Mexico	R. Rebollar
Coastal Research and Education	K. Lindeman
Connecticut Sea Grant Program	N. Balcom
Contractor for NOAA	B. Perkowski
Cornell University	N. Lovejoy
Crustacean Society	A. Humes
Dalhousie University, Nova Scotia	R. O'Dor, J. Wood, A. Perez, J. Manuel, J. Hoar
Department of Fisheries, Bangkok, Thailand	C. Chotiyapetta
EPA, ITIS	B. Lamborne, C. van Hilst
FAO, Rome	K. Carpenter
Fisheries International	J. Sidebotham
Florida Institute of Technology	C. Adams
Florida Research Institute	R. McBride
Focus Magazine, Munich, Germany	S. Sanites
Gulf Coast Research Laboratory, MS	S. Poss, M. Ware, R. Heard
Hakodate University, Japan	J. Bower
Harbor Branch Laboratory, Ft. Pierce	S. Cook
Harvard University	Admissions
Hokkaido University, Japan	J. Bower
ICLARM	R. Froese
INBio, Costa Rica	Y. Garcia
Inst. Tecnol. Pesca, Italy	P. Jereb
Kent State University	A. Tucker, R. Feldmann
L.A. County Museum of Natural History	G. Petit

Langley-Porter Psychiatric Institute, San Francisco	J. Leavitt
Liberty Science Center, Jersey City	B. Faber
Louisiana State University	S. Herke
Universidade de Mar del Plata, Argentina	M. Radonic
Marine Biological Association, U.K.	R. Williamson
Memorial University, Canada	J. Joy
MSNA	S. Miller
Muséum National d'Histoire Naturelle, Paris	M. DeSoutter, D. Gouget
NASA	G. Feldman
National Biological Service, Washington, DC	W. Starnes
National Biological Service, Gainesville	W. Smith-Vaniz
National Fisheries Institute, Arlington	N. Moore, R. Collette
National Food Processors Association	
National Geographic Society	J. Francis, D. Beauchamp, J. Bell, R. Tunnicliff, H. Hoffman
Natural History Museum, London	N. Mours
Netherlands Institute for Sea Research	H. Van der Veer
New Bedford Times	J. Stewardson
New England Aquarium	J. Walsh, M. Mooney-Seuf
NMFS, Headquarters	M. Fraser, T. Ellington, M. Milliken
NMFS, Honolulu	M. Seki
NMFS, Narragansett	K. Sherman
NMFS, Oxford Laboratory	G. Messick, A. Rosenfield
NMFS, Pascagoula	M. Jahnke
NMFS, Sandy Hook	C. Steinwall
NMFS, Sea Grant Fellow	F. Leyva
NMFS, Seattle	D. Somerton, J. Orr
NMFS, Woods Hole	R. Bowman, D. Flescher, J. Pearce, J. Galbraith
NOAA, Office of Chief Scientist	D. Wieting
North Carolina State University	W. Gibson
Northern Virginia Community College	J. Taylor
North Carolina Wildlife Commission, Raleigh	M. Savacod
Occidental University	K. Louie
Old Dominion University	A. Savitsky
Popular Science Magazine	A. Fisher, R. Langreth
Private Citizens	A. McAvoy, E. MacAlaster, J. Reinhardt, R. Moore, V. McKernan, T. Palm, E. Billokur, M. Killgar, S. Auberzinski, L. Galihuer, H. Fisher, S. Macaffee, S. Palmer, S. Appoloniv
Queensland, Australia Dept. Primary Ind. Fish	M. Dunning
Ranger Rick Magazine	E. Lambeth
Russian Academy of Science	K. Nesis
Rutgers University	T. Shank, J. Grassle
Science Application Corporation, Woods Hole	J. Blake
Science Magazine	L. Wolfgang
Scripps Institution of Oceanography	J. Graham
Sea Fisheries Research Institute, South Africa	M. Lipinski
SI	D. Davis, D. Judd, F. Ferrari, B. Youseff, M. Pogue, T. Erwin, A.K. Behrensmeyer
SI, Aquarium	B. Hoffmann
SI, Biodiversity Program	D. Green

SI, Education Project	W. Binder
SI, Exhibits	J. Johnson
SI Magazine	B. Lieberman
SI, NMNH Interns	A. Guthierez
SI, SERC, Edgewater, MD	A. Hines, S. Godwin
South African Museum	P.A. Hulley, M. Roelevold
Tetra Tech, Inc., Fairfax, VA	E. Peters
Texas A&M University	J. McEachran, D. Judd, J. Gold
Texas Parks and Wildlife, Galveston	B. Balboa
Times-Mirror Syndicate	D. Schmidt, M. Webber
Tokyo University	K. Tsuchiya
Tokoru University, Japan	I. Gleadall
Trout Lodge, Summer, WA	M. Jansen
Tulane University	M. Fingerman
University of Aberdeen, Scotland	M. Collins
University of Bridgeport, CT	B. Basta
University of Calif., Berkeley	D. Lindberg, M. Wake
University of Calif., Santa Cruz	A. Anderson
University of Connecticut	S. Spotte
University of Florida	L. Branch
University of Georgia	J. March, J. Benstead, C. Jennings
University of Guam	L. Ward
University of Hawaii	R. Young, A. Keyes
University of Kiel, Germany	U. Piatkowski
University of Maryland	M. Reaka
University of Michigan	G. Naylor, M. Zelditch
University of Mississippi	G. Gaston
University of New England	D. Koester
University of North Carolina, Chapel Hill	T. Hass, B. Kier
University of Oregon	D. Logan
University of Ottawa, Ottawa	F. Chapleau
University of Puerto Rico	M. Lucking
University of Rhode Island	C. Boyco, A. Gonzalez
University of South Carolina	J. Jones
University of South Florida	T. Sutton
University of Texas	R. Hanlon
University of Tokyo	S. Seino
University of Tubingen	O. Gross
University of Western Australia	G. Jackson
USDA	C. van Helft, R. Hodges, A. Solis, E. Grissell
US Food and Drug Administration	S. Randolph
USGS	J. Retepski
Van Camp Tuna	J. DeBeer
VIMS	H. Banford, D. Carlini, I. Bartol B. DuPaul, R. Carnegie, M. Terwilliger, G. White
Virigina Marine Resources Commission	D. Boyd, J. Travelstead
Virginia Polytechnic Institute	G. Flick
Wall Street Journal	C. McCoy
Western Pacific Regional Fisheries Management Council	R. Harman
WHOI	D. Ganon
Yale University	J. Moore, S. Richardson

IDENTIFICATIONS

ORGANIZATION	CONTACT
Bermuda National Museum	W. Sterrer
Cornell University	N. Lovejoy
Delaware Museum	E. Shea
Department of Fish & Game, Dutch Harbor, Alaska	M. Ward
Gulf Coast Research Laboratory	H. Perry
Harvard University, MCZ	K. Hartel
Institute of Oceanographic Science, UK	P. Herring
National Geographic Society	A. Tipton, H. Hoffman
NMFS, Boston	P. Shand
NMFS, Woods Hole	J. Galbraith
North Carolina Maritime Museum, Beaufort	J. Powell
North Carolina State University, Raleigh	P. Bradbury
Nova University Oceanographic Center	C. Messing
Private Citizen	F. Brummer, J. Sprung
Saltwater Sportsman Magazine	B. Gibson
San Diego State University	D. Dexter
SI, SERC	S. Godwin
Smith College	A. Curran
Southampton Oceanographic Center, UK	P. Herring
Universidad del Mar de Plata, Argentina	J.Diaz de Astarloa
University of Delaware	A. Dittel, T. Targett
University of North Carolina, Wilmington	D. Lindquist
University of South Florida	T. Sutton
University of Tubigen, Germany	O. Gross
VIMS	T. Mathes

MANUSCRIPTS REVIEWED

Reviews of 50 manuscripts were provided for: American Malacological Bulletin; Bulletin of Marine Science; Canadian Journal of Fisheries and Aquatic Science; CITES; Copeia; Cybium; Environmental Biology of Fishes; FAO West Central Pacific ID Sheets; Journal of Aquatic Animal Health; Journal of Crustacean Biology; Journal of the Marine Biological Association, U.K.; Journal of Malacology; Journal of Paleontology; Marine Biology; NMFS Headquarters; Oceanography; Philosophical Transactions of the Royal Society; Proceedings of the Biological Society of Washington; Queensland Museum Memoirs; Raffles Bulletin of Zoology; Smithsonian Institution; Smithsonian NMNH Intern Report; Smithsonian Contributions to Zoology; United Nations; U.N. Global Biodiversity Assessment; UNESCO; and Zoological Journal of the Linnaean Society. An additional 21 manuscripts, one thesis and one book were reviewed by NSL staff members for authors at their request.

RESEARCH PROPOSALS REVIEWED

53 research proposals were reviewed by NSL staff for the following organizations: Australian Research Council; California Sea Grant College Program; Louisiana Sea Grant College Program; National Science Foundation (Biological Oceanography, International programs, Systematics); National Sea Grant; NMFS CMER, Rutgers; Pioneer Grant, Department of Commerce; Saltonstall-Kennedy; Smithsonian Institution (Fellowship Proposals and Intern Programs); Washington State Sea Grant College Program; Western Society of Malacologists. Four additional proposals were reviewed for authors at their request.

AMERICAN FISHERIES SOCIETY

Dr. Williams served as a member of the American Fisheries Society Committee on Names of Aquatic Invertebrates.

AMERICAN LITTORAL SOCIETY

Dr. Collette continued to serve on the scientific advisory council.

AMERICAN MALACOLOGICAL UNION

At the annual meeting (Hilo, HI, June), Dr. Vecchione was co-convenor, with R.E. Young and F.G. Hochberg, of an international symposium on the evolution of coleoid cephalopods. Dr. Mickevich presented the keynote address: Cladistic analysis today. Dr. Vecchione chaired two sessions, presented one paper and co-authored another, and helped to demonstrate an on-line bibliography of cephalopod literature.

AMERICAN SOCIETY OF ICHTHYOLOGISTS AND HERPETOLOGISTS

Dr. Collette attended the annual meeting held at the University of Alberta, Edmonton, in June. He participated in the Board of Governors and Business meetings, and presented two posters: one on the ITIS Project (see Biodiversity Section), the other on the ichthyological textbook he has coauthored. Dr. Munroe was co-author on a paper with Dr. Francois Chapleau, University of Ottawa, on phylogenetic relationships of achirid soles (Achiridae, Pleuronectiformes), which was presented by Dr. Chapleau. Dr. Mickevich presented a paper from the Taxon Protocol Committee on combining nomenclature and phylogenetic information from MARBID.

BIOLOGICAL SOCIETY OF WASHINGTON

Dr. Williams served as a member of the Council and continued as Custodian of Publications. Dr. Munroe resigned as Assistant Editor for Vertebrate Zoology in June, after completing a three-year term.

CRUSTACEAN SOCIETY

Dr. Williams presented a poster with H. Curran, and chaired a session at the summer meeting in Fort Pierce, Florida.

CYBIUM

Dr. Collette continued as a member of the Editorial Board of this French ichthyological journal.

FISHES OF THE WESTERN NORTH ATLANTIC

Dr. Collette continued to serve as Chairman of the Editorial Board.

INTERNATIONAL COUNCIL FOR THE EXPLORATION OF THE SEA (ICES)

Dr. Vecchione continues to serve as an official U.S. member of the Working Group on Cephalopod Fisheries and Life History.

MARYLAND STATE GOVERNMENT

Ms. Moore continued to serve as a voluntary member of Asian Arts and Cultural Committee of Maryland Governor's Asian American Advisory Committee and a voluntary member of State of Maryland Arts Council.

NATIONAL SCIENCE FOUNDATION

Dr. Mickevich participated in the Directorate of Biological Sciences Advisory Panel to evaluate proposals in the research experience for undergraduate sites competition.

NOAA, NMFS, SI ANNIVERSARY EXHIBIT

NOAA, NMFS, and the Smithsonian Institution (SI) celebrate their 25th, 125th, and 150th anniversaries, respectively, in 1996. These agencies have shared closely coupled research initiatives throughout the years of their coexistence. In collaboration with the National Museum of Natural History (NMNH), Austin Williams initiated preparation of a temporary exhibit for the public that will feature this cooperative relationship. The exhibit will feature shared fisheries oceanographic research of NOAA, NMFS, and SI, agencies that stemmed from the work of Spencer Fullerton Baird, SI Secretary, 1878-1887, and the first U.S. Commissioner of Fish and Fisheries, the agency that evolved into NMFS. Baird built ships to accomplish

the work, among them the *Albatross I* whose influence is felt in research, data, collections, and publications, including research still in progress. The exhibit, to be displayed in a large glass case in the NMNH north lobby for six months, features a model of *Albatross I*, illustrations of the cruise tracks she followed in course of her 40-year research life, artifacts from sampling at sea (selected specimens, ship's log, field book, etc.), examples of cooperative research between NMFS and SI scientists (Bruce Collette - Robert Gibbs: tunas; Isabel Pérez Farfante - Brian Kensley: penaeidean shrimps; Michael Vecchione - Clyde F.E. Roper: cephalopods), and selected research reports from late 1800's to the present. A video of work at sea on modern NMFS vessels will augment visual effects. A simple printed brochure summarizing the relationship and the exhibit will be a free take away. Planning and execution of this project have been a collaborative effort by NSL staff and the SI Commemorative Committee, with the SI Special Exhibits Department doing major design and construction work, and funding by the NMFS Central Office. The exhibit is due to open in late February 1996.

SMITHSONIAN INSTITUTION

Drs. Collette and Munroe served as Research Associates in the Department of Vertebrate Zoology, Drs. Canet, Williams, and Vecchione in the Department of Invertebrate Zoology.

Dr. Munroe served as advisor for two Smithsonian Vertebrate Zoology Summer Interns. Barnaby Marsh completed his studies on systematics of Indo-Pacific symphurine tonguefishes and Edward Rehfeld examined the taxonomic status of a cynoglossid tonguefish.

Dr. Vecchione served as advisor for NMNH intern Alfredo Gutierrez on a project examining taxonomy and distribution of paralarval ocotopods from the Florida Current.

Dr. Williams served as Editor for manuscripts submitted to *Smithsonian Contributions to Zoology* for the Department of Invertebrate Zoology.

Ms. Moore co-organized the Asian Arts and Craft Festival, as part of Smithsonian-wide celebration of Asian American Heritage Month in May, which was held in the Rotunda of the Natural History Museum. Ms. Moore continued to serve as a Program Assistant Coordinator of Smithsonian's Asian Pacific American Heritage Committee which organizes the annual Asian Pacific American Heritage month-long celebration.

Dr. Vecchione is a member of the technical review committee for the upgrade of exhibits in the Marine Hall.

NSL staff participated in an open house at the Museum of Natural History for Congress and congressional staff. Drs. Collette, Munroe and Williams manned a table in the Ocean Planet Exhibit, while Dr. Vecchione was adjacent to the Giant Squid Exhibit.

UNITAS MALACOLOGICAS

As rapporteur for the International Symposium on the Functional Morphology of Cephalopods, which was convened as part of this international meeting of mollusc researchers in Vigo, Spain, Dr. Vecchione presented the introductory and concluding remarks. He also presented two papers, as well as an informal presentation of videotapes of deep-sea cephalopods recorded in-situ from submersibles.

VOPROSY IKHTIOLOGIYA

Dr. Collette continued on the editorial board of this Russian ichthyological journal.

OTHER MEETINGS ATTENDED

American Association for Zoological Nomenclature
American Fisheries Society, Potomac Chapter
American Fisheries Society, Annual Meeting of Committee on Common Names of Aquatic Invertebrates
American Society of Zoologists
Association of Systematics Collections
National Museum of Natural History, J. L. Barnard Memorial Symposium
Smithsonian Institution Biodiversity Meeting
Smithsonian Institution Senate of Scientists
Willi Hennig Society

ALBERT EINSTEIN HIGH SCHOOL, MONTGOMERY COUNTY, MARYLAND

Dr. Williams served as advisor for intern, Mr. Peter Falk, during the fall/winter term.

BERMUDA BIOLOGICAL STATION

Dr. Collette offered a summer course on "Biology of Fishes" to 15 students from several countries during July.

DALHOUSIE UNIVERSITY, HALIFAX, N.S., CANADA

Dr. Vecchione served as external examiner of a dissertation on growth of juvenile short-finned squid submitted for the Ph.D. degree.

ELEANOR ROOSEVELT HIGH SCHOOL, HYATTSVILLE, MARYLAND

Dr. Munroe served as advisor for senior student, Mr. Reza Lubis, who conducted research on systematics of soleid flatfishes.

HARVARD UNIVERSITY

Dr. Collette continued as Research Associate in the Department of Ichthyology, Museum of Comparative Zoology.

KING GEORGE COUNTY SCHOOLS

Dr. Vecchione taught a class on squids for "learning disabled" and "at risk" students.

NORTHEASTERN UNIVERSITY

Dr. Collette was reappointed as Adjunct Professor of Biology.

UNIVERSITY OF MARYLAND

Dr. Mary Mickevich advised Ph.D. student, Valerie Ceppula, who is doing research on stomatopod crustaceans.

UNIVERSIDADE DE MAR DEL PLATA, ARGENTINA

Dr. Munroe taught a three-week course during December on "Ecology of Fishes" to 12 students enrolled in the Department of Marine Sciences.

VIRGINIA INSTITUTE OF MARINE SCIENCES (VIMS), COLLEGE OF WILLIAM AND MARY

A Memorandum of Understanding was signed between NEFSC and VIMS to formalize existing relationships between NSL and VIMS and to facilitate future cooperative studies between NEFSC and VIMS. Mike Vecchione had three students at VIMS during this period. Former NSL employee Liz Shea completed and defended her MS thesis on the paralarval concept for cephalopods. David Carlini continued his Ph.D. research on a biochemical phylogeny of coleoid cephalopods. Ian Bartol began his Ph.D. on the physiological ecology of *Lolliguncula brevis*. Bruce Collette continued to advise VIMS student Heidi Banford who is currently in residence at the Smithsonian Tropical Research Institute in Panama sequencing DNA for American Spanish mackerels, halfbeaks, and needlefishes. Tom Munroe served as advisor for an MS student, Mark Terwilliger, who is researching age-growth and reproductive biology of blackcheek tonguefish, *Symphurus plagiusa*, in Chesapeake Bay. Tom is also advising another MS student, Geoffrey White, who is studying fecundity and reproductive biology of tautog from coastal waters of Virginia. NSL Zoologist Martha Nizinski is pursuing her Ph.D. at VIMS studying the effects of disturbance on spiny lobster trophic ecology and benthic community structure in Florida and the Bahamas.

WAKEFIELD HIGH SCHOOL, ALEXANDRIA, VIRGINIA

Dr. Williams served as a judge for zoological entrants in the District Science Fair.

NATIONAL SYSTEMATICS LABORATORY PAPERS AND POSTERS PRESENTED AT SCIENTIFIC MEETINGS, 1995

COLLETTE, B.B., R. McDiarmid, and M.F. MICKEVICH. Interagency taxonomic information system (ITIS). 75th Annual Meeting American Society of Ichthyologists and Herpetologists.

H.A. Curran, and A.B. WILLIAMS. Callianassid shrimp bioturbation in Bahamian reefal environments: effects and significance. Eighth International Coral Reef Symposium.

MICKEVICH, M.F. The character as the integrative evolutionary unit. Annual Meeting of the American Society of Zoologists.

MICKEVICH, M.F. Cladistic analysis today. Keynote Address at the American Malacological Union.

MICKEVICH, M.F., B.B. COLLETTE, K. Fauchald, M. Fraser, T. MUNROE, M. VECCHIONE, and A. WILLIAMS. Combining nomenclature and phylogenetic information within the (USMBD) (United States Marine Biodiversity Database of NOAA/NMFS. 75th Annual Meeting American Society of Ichthyologists and Herpetologists.

MUNROE, T.A., and F. Chapleau. Familial interrelationships of the Achiridae (Pleuronectiformes): morphological evidence. 75th Annual Meeting American Society of Ichthyologists and Herpetologists.

C. Roper, and M. VECCHIONE. *In situ* observations on *Brachioteuthis*: paired behavior, possibly mating. Annual Meeting of American Malacological Union.

C. Roper, and M. VECCHIONE. Functional morphology for feeding and swimming in *Mastigoteuthis magna*: *in-situ* observations. Unitas Malacologicas meeting.

Sweeney, M., C. Roper, and M. VECCHIONE. Demonstration of online access to the cephalopod computerized bibliographic system. Annual Meeting of American Malacological Union.

VECCHIONE, M. Life in midwaters. Public lecture at National Museum of Natural History for Ocean Planet Exhibit.

VECCHIONE, M., and R.E. Young. Aspects of the functional morphology of cirrate octopods: locomotion and feeding. Unitas Malacologicas meeting.

VECCHIONE, M., and R.E. Young. Analysis of characters to determine ordinal relationships of extant cephalopods. Annual Meeting of American Malacological Union.

NATIONAL SYSTEMATICS LABORATORY PUBLICATIONS, 1995

Carpenter, K.E., B.B. COLLETTE, and J.L. Russo. Unstable and stable classifications of scombroid fishes. Bull. Mar. Sci. 56(2):379-405.

COLLETTE, B.B. Families Batrachoididae (pp. 910-918), Belonidae (pp. 919-926), Coryphaenidae (pp. 1036-1038), Hemiramphidae (pp. 1175-1181), Scombridae (pp. 1521-1543), and Xiphiidae (pp. 1652-1652). *In*: W. Fischer et al., eds. Guía identificatión de especes para los fines de pesca. Pacífico centro-oriental. Vols. II-III, FAO, Rome.

COLLETTE, B.B. *Tondanichthys kottelati*, a new genus and species of freshwater halfbeak (Teleostei: Hemiramphidae) from Sulawesi. Ichthyol. Explor. Freshwaters 6(2):171-174.

COLLETTE, B.B. and M. VECCHIONE. Interactions between fisheries and systematics. Fisheries 20(1):20-25. Republished in Current, J. Mar. Ed. 13(2):26-32.

Felley, J.D. and M. VECCHIONE. Assessing habitat use by nekton on the continental slope using archived videotapes from submersibles. Fish. Bull., U.S. 93(2):262-273.

Kornfield, I., A.B. WILLIAMS, and R.S. Steneck. Assignment of *Homarus capensis* (Herbst, 1792), the Cape lobster of South Africa, to the new genus *Homarinus* (Decapoda: Nephropidae). Fish. Bull., U.S. 93:97-102.

MUNROE, T.A., F. Krupp, and M. Schneider. Family Cynoglossidae (pp. 1039-1059). *In*: W. Fischer et al., eds. Guía FAO para la identificación de especes para los fines de la pesca. Pacífico centro-oriental. Vol. 2.

Pequeqnat, L.H., and A.B. WILLIAMS. Two new species of *Munidopsis* (Decapoda, Anomura, Galatheidae) from the western Atlantic Ocean. J. Crust. Biol. 15(4):786-792.

Poss, S.G. and B.B. COLLETTE. Second survey of fish collections in the United States and Canada. Copeia 1995(1):48-70.

Rodríguez, G., and A.B. WILLIAMS. *Epilobocera wetherbeei*, a new species of freshwater crab (Decapoda: Brachyura: Pseudothelphusidae) from Hispaniola. Proc. Biol. Soc. Washington 108:76-83.

Sakurai, Y., R.E. Young, J. Hirota, K. Mangold, M. VECCHIONE, M.R. Clarke, and J. Bower. Artificial fertilization and development through hatching in the oceanic squids *Ommastrephes bartramii* and *Sthenoteuthis oualaniensis* (Cephalopoda: Ommastrephidae). Veliger 38(3):185-191.

VECCHIONE, M. and M.R. Lipinski. Descriptions of the paralarvae of two loliginid squids in southern African waters. S. Afr. J. Mar. Sci. 15:1-7.

VECCHIONE, M. and M.J. Sweeney. Comments on the proposed conservation of the specific names *Octopus vulgaris* Cuvier, [1797] and *Loligo vulgaris*, 1798 (Mollusca, Cephalopoda). Bull. Zool. Nomen. 52(4):333-334.

WILLIAMS, A.B. Chapter 2, Taxonomy and evolution, pp. 13-21. In J.A. Factor, ed., The American Lobster. Academic Press, N.Y.

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STAFF

Bruce B. Collette	Laboratory Director and Ichthyologist
Isabel C. Canet (Pérez Farfante)	Carcinologist Emeritus
Thomas A. Munroe	Ichthyologist
Michael Vecchione	Squid Biologist
Austin B. Williams	Carcinologist
Grace Klein-MacPhee	Fishery Biologist (Resigned, April 4)
Keiko H. Moore	Scientific Illustrator
Martha Nizinski	Zoologist
Ruth Gibbons	Museum Specialist
Deborah L. Loffler	Zoologist
Alsane A. Soumah	Museum Aide (Temporary)
Mary F. Mickevich	Research Associate
David Stein	Visiting Investigator